Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

LIBRARY
RECEIVED
FEB 13 1939
U.S. Department of Agriculture

U. S. DEPARTMENT OF AGRICULTURE

FARMERS' BULLETIN No. 1643 rev. Jan. 1938

FIRE SAFEGUARDS FOR THE FARM

THIS BULLETIN tells how to lessen or avoid fire hazards on the farm and thereby add to the safety of property as well as persons. It points out how the individual farmer can further reduce the probability of serious fire losses by means of simple home equipment with which a fire that is discovered in its beginning stage can be quickly extinguished. Finally, it points out the need for organized and well-equipped rural fire departments and tells how this need has been met in many rural communities. Such organized protection is necessary for the farmer in order to hold the loss to a minimum whenever a fire gets a start.

Reasonable care and forethought in the removal of needless fire dangers, a fair degree of individual preparedness, and the availability of community fire protection will greatly reduce the fire losses on American farms. These losses total about $100,000,000 a year.

Substantial reduction in the number and destructiveness of farm fires, which often destroy human life as well as property, will eliminate much unnecessary hardship and sorrow and will help to promote rural progress and well-being.

This bulletin supersedes Farmers' Bulletin 904, Fire Prevention and Fire Fighting on the Farm.

Washington D. C.

Issued November 1930
Revised January 1938

FIRE SAFEGUARDS FOR THE FARM

By V. N. VALGREN, formerly *senior agricultural economist, Bureau of Agricultural Economics,* HARRY E. ROETHE, *senior engineer, Chemical Engineering Research Division, Bureau of Chemistry and Soils, and* M. C. BETTS,[1] formerly *senior architect, Division of Agricultural Engineering, Bureau of Public Roads*

Revised by V. N. VALGREN, *principal agricultural economist, Farm Credit Administration,* HARRY E. ROETHE, *senior engineer, Chemical Engineering Research Division, Bureau of Chemistry and Soils,* WALLACE ASHBY, *Chief, Division of Structures, Bureau of Agricultural Engineering,* and WILLIAM H. ROWE, *senior agricultural economist, Bureau of Agricultural Economics*

CONTENTS

INTRODUCTION

THREE KINDS or classes of safeguards are required to make farm property reasonably safe from fire. By the proper application of these safeguards the annual farm-fire loss could be reduced $50,000,000 or more. Even this reduction would merely cut in half the annual loss of about $100,000,000. Students of fire prevention and protection are generally agreed that considerably more than half of the farm fires that occur in any given year, could readily be prevented. The further fact that accidental fires, both on the farm and in the city, frequently destroy human life as well as property makes the problem of fire safety doubly important.

The first of these safeguards is the exercise of care and forethought in the construction, maintenance, and use of the property, with a view to eliminating, so far as possible, all needless fire danger. The second is individual or home preparedness in the form of simple equipment for use in extinguishing fires before they reach serious proportions. The third is community preparedness, consisting of a fire-fighting organization equipped to check larger fires or to prevent their spread to buildings other than those in which the fires originate. Such an organization, with more effective equipment than the individual farmer can maintain, is needed to hold the loss to a minimum in those cases in which the first two classes of safeguards have failed or threaten to fail.

[1] Mr. Betts died December 22, 1936.

These three classes of safeguards together make a triple line of defense against destruction by fire, each class supplementing the other two. The order in which they have been given may be said to be the order of their importance as well as the order in which they should be applied. The first class of safeguards really consists of means and methods of avoiding fire danger and constitutes fire prevention. The second and third are means and methods of fire fighting, or fire protection as it is usually called.

Without the exercise of care and forethought in prevention, fires are likely to occur so frequently and to spread so quickly that no form of protection will prevent serious losses. Without individual preparedness by means of simple fire-fighting equipment, most of the fires that do occur are likely to result in serious losses. Without community equipment and organization, a fire that is not promptly stopped by the use of home equipment is likely to destroy not only the building in which it originates but nearby buildings and other property.

If the first and second of these sets of safeguards, or either of them, could be made perfect, the need for the third—organized or community fire protection—would disappear. But such perfection has never been reached, in the United States or elsewhere. Furthermore, it is admitted that complete fire safety through individual action or even through combined individual and community action is probably an unattainable goal.

Reasonable preventive measures, and reasonable preparedness against such fires as may occur, are all that can properly be recommended or practiced. Beyond such rational limits, measures for fire prevention and protection become unduly costly or burdensome. No one would recommend, for example, that heat and light be dispensed with in the homes because they cannot be made absolutely free from danger of fire, or that fire-fighting forces and equipment should be maintained by farmers on the same elaborate scale that prevails in congested and high-value city districts. With moderate and practical preventive measures the probability of serious loss by fire to the individual farmer can be greatly reduced. In fact, property and persons can be made reasonably safe against loss or destruction by fire without resorting to extreme measures, and when these reasonable precautions have been taken by a community, insurance against such infrequent losses as may occur should be obtainable at very moderate cost.

But how many farms or how many rural communities in the United States are now safeguarded against fire to a reasonable degree? The cost of fire insurance in many parts of the country and the estimates of our total farm fire loss give a rather distressing reply. No complete or highly reliable figures for our annual farm fire losses are available. Private estimates vary from $60,000,000 to $150,000,000. Such official reports and figures as are available for fire losses of farm property suggest that those losses have been as high as $100,000,000 in some recent years. This estimate was approved by the Committee on Farm Fire Protection of the National Fire Protection Association.

Commercial farm-insurance rates for limited sections of the country reach $2 per $100 per year under certain conditions. Even for sections or States in which fire insurance in farmers' mutual com-

panies can be obtained at an average cost of about 20 cents per $100 per year and in which commercial rates are only moderately higher, there is good reason to believe that the farm fire losses are fully twice what they would be if moderate and rational safeguards against fire were employed by all farmers. Here, as in districts less fortunate from a fire-loss standpoint, the added personal safety and the removal of much of the worry and privation that accidental fires usually bring in addition to the direct fire loss, would represent as important gains as would the savings from a reduced cost of insurance.

ELIMINATION OF FIRE DANGER

In the first class of safeguards, or measures for the elimination of fire danger, the questions and problems involve considerations of safe construction, proper maintenance, and due caution in the use of heating, lighting, and other equipment and materials that involve danger to property and life.

CONSTRUCTION AND MAINTENANCE

LOCATION OF BUILDINGS

The first question in connection with the construction of a building is its location with reference to other buildings on the farmstead. The barn, or barns, in which hay and straw are stored and used, and about which some litter is at times unavoidable, should normally be separated from the dwelling wherein fire is regularly used, by a distance of at least 100 feet. A clear space of 150 feet is held to give practical security from exposure fires. Where other considerations make such spacing of the buildings impossible or inadvisable, special consideration should be given to other protective measures, such as the use of noncombustible or fire-resistant construction materials, by means of which the hazards due to proximity of these buildings to one another can be partially offset.

Another important consideration is that of so placing the main buildings, particularly the dwelling and the barn, that the prevailing winds in the locality blow at right angles to a line connecting these buildings, rather than parallel to such a line. If the dwelling and barn are so placed that the prevailing winds blow along the line connecting them, the fire hazard is materially increased. With a strong wind blowing from the dwelling to the barn, there is the danger not only that the burning of the dwelling will seriously endanger the barn but also that on some dry and windy day sparks from the dwelling-house chimney may set fire to the barn. With the wind blowing from the barn to the dwelling, the main danger is that if the barn should burn, the dwelling would be seriously endangered by the strong heat and the flying sparks that are particularly characteristic of a barn fire. The result might be a disaster such as that pictured in figure 1. In addition to the fire hazard involved, a farm lay-out in which the prevailing winds blow from the barn or the hoghouse to the dwelling, is objectionable because the dwelling will be needlessly subjected to disagreeable farmyard odors.

In few, if any, localities is the wind movement consistently from any one direction, or along a given line. Regardless of how the buildings are placed with reference to one another the wind direction

at times will be either directly from the dwelling to the barn or from the barn to the dwelling. In practically all sections, however, there is a prevailing wind direction. To ignore this fact is to increase

FIGURE 1.—Farm fires often leave only ashes and scrap iron.

unnecessarily the danger of serious loss from fire and to incur other unnecessary discomfort. In a given locality, for example, the prevailing winds may be from the northwest to the southeast, or the

FIGURE 2.—Wind direction should be considered in planning a farm lay-out.

reverse, fully three-fourths of the time. In such a locality the farm lay-out should, if possible, place the barn either northeast or southwest of the dwelling.

The prevailing wind directions in all parts of the United States are indicated in figure 2. The arrows indicate, for their respective localities, only the wind direction that prevails to a greater extent than does any other. In many cases, the second most common wind direction is the point of the compass opposite that representing the most common or prevailing direction. If the farm lay-out, therefore, is so planned that the line connecting the main buildings is approximately at right angles to the line of the more common wind directions, the occasions when the wind blows either from the barn to the dwelling or from the dwelling to the barn will be relatively infrequent.

It is impracticable, in this bulletin to give complete information on the wind directions for all localities, but more complete information can easily be obtained. The United States Weather Bureau maintains section centers or regional head offices to which the local stations send their data for further compilation and analysis. These section centers are located at the capitals of the respective States except as indicated in the accompanying list.

State	*Weather Bureau section center*	*State*	*Weather Bureau section center*
California	San Francisco.	New England (all six States)	Boston.
Delaware	Baltimore.	New York	Ithaca.
Florida	Jacksonville.	Oregon	Portland.
Kentucky	Louisville.	Pennsylvania	Philadelphia.
Louisiana	New Orleans.	South Dakota	Huron.
Maryland	Baltimore.	Texas	Houston.
Minnesota	Minneapolis.	Washington	Seattle.
Mississippi	Vicksburg.	West Virginia	Parkersburg.
Missouri	St. Louis.	Wisconsin	Milwaukee.
Nevada	Reno.		

By addressing the United States Weather Bureau Office at the capital city of the State, or, for the States listed, at the city named, anyone can obtain more complete information on the wind directions for his locality, including not only the direction of the prevailing wind but the percentage of the time that the wind comes from each of the commonly recognized points of the compass.

ROOFING MATERIAL

The kind of roofing material to be used is particularly important in the construction of dwellings on the farm, as elsewhere. Other buildings may shelter animals and other valuable property. The dwelling shelters the family. Heating apparatus is an essential part of the home, and effective spark arresters are not usual on farm dwellings. It is probable, therefore, that at times sparks will fall on the roof. Failure to keep the chimney clear of accumulations of soot adds greatly to this danger. Especially on days of high wind and strong draft these soot accumulations are likely to ignite and temporarily transform the chimney into a roaring furnace. In any case, should fire originate in some other building, the roof of the dwelling may be exposed to flying brands.

A substantial roof [2] of tile, slate, metal, or other noncombustible, fire-resistant or fire-retardant roof covering of the better grades, requires a somewhat greater initial cost than one consisting of wooden shingles or of thin roll roofings, but it adds materially to

[2] See Farmers' Bulletin 1751, Roof Coverings for Farm Buildings and Their Repair.

safety from fire. It also lessens the possibility of flying brands that might set fire to nearby buildings in case a fire originates in the dwelling.

If wooden shingles are to be used, poor grades should be avoided, particularly for buildings with heating plants, and the best grade of edge-grain shingles should be insisted upon for the more important buildings. Flimsy and cheap grades of manufactured roofing should be avoided even though they may be found more or less fire resistant while they are in good condition. For all varieties of roofing material, the cost per year of service rather than the initial cost is the final test of economy. The danger that chimney sparks, or brands from a nearby fire, may ignite a roof that is covered with dry wooden shingles is greatly increased when the shingles are old, frayed, and warped. Roofs of other material when in poor repair also increase the danger of fire. Such dilapidated roofs on dwellings should be replaced or recovered not only to give renewed weather protection, but to remove a special fire hazard.

CHIMNEY CONSTRUCTION

Defective chimneys are one of the most frequent causes of fires in dwelling houses. The construction of the chimney deserves special attention, and under no circumstances should the effort to avoid a slight expense in the construction of this feature be permitted to make the home a firetrap. For safety in chimney construction, substantial masonry is necessary, and this should always rest firmly upon the ground and not on brackets or on any part of the building, unless a substantial cellar wall is considered such a part. All new chimneys [3] should be built with sound walls at least 4 inches thick if brick or reinforced concrete is used, and not less than 8 inches for hollow tile, and 12 inches for stone construction. All such chimneys should be lined with flue linings of fire clay or vitrified clay. No woodwork should be built into or be in direct contact with the masonry of any chimney.

Chimneys disintegrate most quickly at the top, owing to the combined action of weather and hot gases. Lime mortar in the joints and soft brick are soon affected, so that wide cracks are formed, permitting the passage of sparks. Such a condition is frequently found in old chimneys to a point well below the roof. It is a source of great danger. Small cracks may be filled with good mortar consisting of 1 part portland cement, 1 part hydrated lime or slaked-lime putty, and 6 parts of clean sand. If there are many cracks or if the bricks are eaten away the chimney should be torn down to solid construction and rebuilt with hard-burned brick and good cement mortar. A crack in a chimney may be located by building a smudge in the fireplace and covering the top of the chimney with a board or wet sack. Escaping smoke will then quickly reveal any crack or cracks in the chimney walls.

FIRE STOPPING

In the construction of walls of the dwelling fire stopping should be given due consideration. By fire stopping is meant particularly the closing of all open spaces in hollow walls at the floor line so that fire will not pass quickly from the basement to the house above, or

[3] See also Farmers' Bulletin 1649, Construction of Chimneys and Fireplaces.

from one story to another. The added cost of this precaution in the construction of a dwelling is small in comparison with the added fire safety that it gives.

Open stairways are a source of danger because when a fire has started in the cellar or lower floor of a house they may act as passageways for the fire and may soon become impassable. Loss of life in farm fires and injuries suffered in trying to escape are often the result of this condition. The victims are trapped on an upper floor. A second stairway in another part of the house or a porch deck or roof onto which the family may escape may mean the difference between safety and serious injury or death.

Many of the precautions recommended for dwelling construction apply also to barns. The least that should be done is to provide a substantial floor over the stock, if hay is stored above, to prevent rapid burning through, should the hay be ignited. This will increase the opportunity to save valuable stock. All hay chutes and stairways should be closed lest a fire below spread rapidly to the hay above, or burning hay from the mow drop into the stable below.

The specific suggestions regarding fire-protective construction on the farm, given in Farmers' Bulletin No. 1590 should be of much value whenever important alterations are to be made or new buildings are to be erected. A copy of this bulletin may be had free if a request is addressed to the United States Department of Agriculture.

LIGHTNING PROTECTION

Protection against lightning is important, as lightning is one of the more frequent causes of fire in farm buildings, in most parts of the United States. Excepting possibly a few localities in the far West and especially in the Pacific Coast States, where the lightning hazard is unusually slight, no farm building of substantial value should be considered actually completed until it has a standard system of protection against lightning. Individuals can still be found who question the value of protection from lightning by means of a system of grounded conductors or by the proper grounding of substantial metal roofs, but the evidence of the value of such protection leaves no reasonable room for doubt.

The lightning-protection system should be inspected at least once a year, and particular attention should be given to the rods at the points at which they enter the ground. It is here that corrosion of the metal or the down conductors is most likely to occur. Mechanical injury to the rods also most frequently occurs at or near the ground.

All who have looked with some care into the question of the value of protection from lightning agree that, when applied according to accepted modern methods and standards, it possesses a high degree of efficiency. This efficiency has been calculated as ranging from about 85 percent to 98 or 99 percent, the higher figures applying to systems that comply with present standards. A 98-percent efficiency in this case means that the probability of loss or damage from lightning is so reduced by the protective system that only two cases of damage from lightning actually occur to protected buildings for each hundred cases of damage that occur to the same number of unprotected buildings under the same general conditions.

25024°—38——2

More detailed information regarding the value of lightning protection and methods of providing such protection is found in Farmers' Bulletin No. 1512.

ELECTRICAL INSTALLATIONS

When properly installed and used, electricity is one of the safest and most convenient sources of light, heat, and power. But electrical installations may present serious fire hazards unless the wiring is adequate and safe and unless care is taken in the selection, installation, and operation of the equipment. All wiring should be installed in accordance with the provisions of the National Electrical Code and State or local regulations. Prompt repair of faulty wiring is essential to the continued safe operation of any farm installation. Where a continuous underground metallic water-piping system is not available as a grounding electrode and where it is not practicable otherwise to secure a ground of permanently low resistance, the use of a wiring method that does not employ metal enclosures for the wires is recommended. Motors and other electrical equipment should meet the requirements of and be installed and used in accordance with the National Electrical Code and the manufacturer's instructions. It is especially important that any electrical equipment that is installed in damp places or near flammable material or in other hazardous locations be inspected by a qualified person to make sure that all safety requirements are properly met.

One of the most serious fire hazards is the use of improvised fuses or fuses of too great amperage, which will permit the wiring to carry too much current and get dangerously hot. Larger wires and more branch circuits will prevent overloading and consequent heating of conductors and blowing of fuses. A new type of circuit protection does not use fuses. It breaks the circuit automatically under excess loads, cannot readily be overloaded, and is easily reset for use. Frequent inspection of cords for portable appliances and replacement of those damaged or worn out will greatly reduce the fire hazard from wiring installations otherwise in good condition. Many disastrous fires have been started by the careless handling of flatirons, curling irons, and similar devices. When left standing with the current on, such devices become excessively hot and may ignite wood or other flammable material.

HAZARDS AND DANGERS FROM CARELESSNESS

A very large percentage of farm fires are due to carelessness in the placing and in the use of heating and lighting equipment. Thousands of farm homes and hundreds of lives are lost each year because of lack of care and forethought in the selection, installation, placement, and operation of stoves, lamps, and other heating and lighting apparatus.

STOVES AND FURNACES

Stoves and furnaces should be put up solidly and should be so placed that the heat from them cannot ignite nearby walls or woodwork of any kind. If the room is such that it does not permit placing the stove at sufficient distance from the walls to avoid danger to exposed woodwork, the wall should be covered with sheets of metal or asbestos. A substantial metal or asbestos covering should also

be placed under the stove, and this protective covering should extend well out beyond the edge of the stove, particularly on the side containing the door to the firebox, from which burning embers are likely to fall.

Stoves or furnaces should be of such size that enough heat can be generated to keep the house at the proper temperature even in cold weather without crowding or overheating them. This precaution adds greatly to the life of the apparatus as well as to the fire safety of the dwelling.

Stoves and pipes, as well as chimneys, should be cleaned from time to time by removing all accumulations of soot. In the absence of any better device for sweeping the chimney, a bundle of twigs or branches of evergreen tied to a rope will be found relatively effective. Even a bundle of coarse hay, the wisps of which are well twisted together, makes a usable brush for sweeping the chimney. Specially constructed wire-brush chimney cleaners have also been devised.

STOVEPIPES

Stovepipes should enter directly into the chimney without passing through walls or partitions. If a house is so constructed that the chimney cannot be reached without passing the stovepipe through a wall except at considerable expense, a ventilating thimble should be provided. This thimble, which may be obtained at almost any hardware store and fitted into the wall, greatly reduces the danger of fire from an overheated pipe, since air circulates through the open spaces in the thimble on all sides of the pipe and carries off the heat to a considerable extent. Smoke pipes should not pass through floors, closets, or other concealed spaces. Such practice often results in fires that are not discovered until they have gained serious headway.

FIREPLACES

Open fireplaces are favored by many because of their cheerful effect. Unprotected fireplaces may involve a considerable danger, however, especially in homes in which there are small children. Besides the danger from flying sparks, clothing may be set afire by close approach to the flames, and children at play may fall into the fire. A substantial screen is always necessary before a fireplace that is in use, to avoid danger to the furnishings as well as to persons.

OIL STOVES

Oil stoves for cooking purposes, and sometimes for heating, are found in farmhouses. Most of these stoves burn kerosene, but others are constructed for burning gasoline. Oil stoves are dangerous unless used with due care, and those burning gasoline require even greater precaution than those in which kerosene is used.

LAMPS

Oil lamps will probably continue for some time as the most common source of light on the farms, notwithstanding a constant increase in the number of farm homes provided with more modern lighting systems. All oil lamps intended to stand on tables or desks should, for the sake of safety, have a relatively wide base so that they will not easily be tipped over. A metal lamp has an advantage over a glass lamp in that if it should be accidentally tipped over or dropped to the

floor, it will not break, and so is not likely to involve flooding the room with burning oil. Gasoline lamps are occasionally used; they involve added possibility of serious accidents unless handled with special precaution and care.

All oil lamps, as well as oil stoves, should be filled by daylight. Even then, care should be taken that the filling is done well away from a heated stove or a flame of any kind. The oil chamber should never be poured so full that there is not ample room for the slight expansion of the oil that results from the heat generated by the lighted wick. If the lamp is so full that the oil extends almost up to the flame the expansion may cause an overflow of burning liquid that endangers the family as well as the house. Lamps should never be placed on rickety boxes or stands but only on solid tables or furniture suitable for the purpose. Furthermore, they should be placed well away from the edge of the supporting surface, so that they will not be tipped over and thrown to the floor.

KEROSENE TO QUICKEN FIRE

The use of kerosene to kindle or quicken fires in stoves or furnaces has caused many disastrous explosions and fires. If the stove is still warm from the last fire, or if a smoldering fire is in the stove at the time kerosene is poured on, the danger is particularly great. The reports of the State fire marshals abound in specific and often gruesome warnings against the use of kerosene to quicken fires.

GASOLINE

Although the use of gasoline in lamps or stoves may not be increasing since there is a growing use of electricity, improved kerosene-using devices, and other factors, the use of this powerful oil product for other purposes is becoming more and more common with the increase in the number of automobiles, tractors, and gasoline engines. With proper care, gasoline can be safely handled, but the nature and explosive power of the vapor from this liquid should be kept in mind wherever and whenever it is used. Gasoline in large quantities, outside of special storage area, should be stored only in underground tanks from which it is pumped as needed. To store gasoline on the premises in other ways involves considerable possibility of accident. If practiced, the dangers should be fully recognized and guarded against by every practicable safety measure. It is unwise and reckless to store gasoline inside any farm buildings. The vapors from this liquid are heavier than air and tend to form first along the floor. A room may contain considerable gasoline vapor before it becomes perceptible to a person in the room; a flame or a spark may cause an explosion before the vapor is noticed. No open flame of any kind should be permitted nearby when gasoline is being handled or poured. All portable containers for gasoline should be tightly closed and painted a bright red and should be distinctly labeled **Gasoline.**[4]

BOTTLED GAS

The use of bottled gas for cooking and other purposes is increasing rapidly in many rural sections. Bottled-gas installations should be made in accordance with the requirements of the Underwriters' Lab-

[4] See Farmers' Bulletin 1678, Safe Use and Storage of Gasoline and Kerosene on the Farm.

oratories and any local ordinance effective for that type of fuel. The instructions furnished by all distributors of such fuel should be followed by the user.

ACETYLENE

Acetylene generated in private plants is used on a considerable number of farms. If the plant and fixtures are properly constructed, installed, and cared for, acetylene is as safe as other recognized means of providing light for the farm and heat for cooking purposes. But this form of gas, which is generated by placing calcium carbide in contact with water, is highly explosive when mixed with a certain quantity of air. The carbide, stored for future use in the generator, must be kept perfectly dry and must be kept in a well-ventilated place. No flame of any kind should be brought near the generator. If a leak in the system is suspected, it should never be searched for by the use of any form of light with a flame.

INCUBATORS AND BROODERS

Incubators and brooders carry an element of danger. The fact that they are left burning unattended for long periods makes the danger of accidental fire greater than in the case of oil-burning equipment in the home. The barn is usually one of the worst places to operate these oil-burning devices. If possible, they should be operated in some smaller detached building or shed where, if fire does occur, the loss may be held to a minimum.

GASOLINE FOR CLEANING PURPOSES

The use of gasoline for cleaning purposes involves serious hazards. Many fatal accidents have resulted from this practice. In the open air, the vapor from the gasoline will diffuse rather promptly and lose much of its explosive nature. Indoors the danger is particularly great, because the vapor from open gasoline containers, or from garments saturated with this liquid, is confined and may cause a destructive explosion if a spark or flame of any kind comes in contact with it. The mere rubbing of silk fabric may produce a spark that will ignite gasoline vapors. The use of benzene or naphtha for cleaning purposes must be placed in the same hazardous class of practices. Many safe cleaning fluids that will neither explode nor burn are available. The safe practice is to use only such noncombustible cleaning fluids.

MATCHES

Matches are one of the greatest conveniences of civilized man, but their very convenience and the ease with which fire may be produced any time and anywhere lead to many accidents and destructive fires. Matches are especially dangerous in the hands of children and constitute a serious menace to them as well as to property.

The double-tipped parlor match, which can be recognized by its head of two colors, is considerably safer than the ordinary parlor match, because ignition can take place only when friction strikes the end of the match head. Such a match is rarely ignited by being stepped upon or crushed.

But the match that involves the least danger of accidental fire is the well-made safety match that will ignite only when rubbed upon the specially prepared surface of the side of the box. Such matches

never ignite because accidentally stepped upon or crushed. Unless match stems are made of straight and firm wood, there is danger that the stem will break when the match is struck, and that the burning head will set fire to clothing or other material upon which it falls. Particularly on farms, it seems advisable to use only good grades of matches which can be ignited only when struck on the box. Any other kind may cause a fire by being dropped accidentally in hay and litter and becoming ignited by friction caused in some unexpected way.

Regardless of the kind of matches used, they should be so stored or kept as to be out of reach of small children. Near the stove or other place where matches are regularly used, a metal or glass receptacle for the partially burned match stems should be provided. Throwing supposedly dead matches into the wastepaper basket or the wood box has caused many fires.

FIGURE 3.—A barn fire spreads rapidly and, unless extinguished before it has a real start, the building is likely to be doomed.

CARELESS SMOKERS

The careless smoker with his matches is often as great a danger to property as is a child with matches. This danger consists not only in the voluntary lighting of matches and throwing them away before they are completely extinguished but in the accidental dropping of matches in dry hay or litter where they may later ignite by being stepped upon or by friction caused in other ways. The unextinguished cigar butt and particularly the cigarette butt, thrown away while still burning, constitute a serious fire menace. They have been responsible for numerous fires in buildings as well as in forests and fields when grass and leaves are dry. Smoking in or about the barn or other outbuildings that contain combustible material should not be tolerated. The result may be a scene such as that shown in figure 3.

DISPOSAL OF ASHES

The careless disposal of ashes from stoves or furnaces in active use has caused many farm fires. Even when the ashes recently shaken from the firebox appear to be dead, they may contain live coals which a wind may scatter in dry grass or litter and fan into a flame. Unless metal cans or receptacles are available for the disposal of ashes, care should be taken to see that the ashes are actually dead before they are thrown out and left unguarded. This is particularly important in dry seasons. Safety, as well as considerations of neatness, suggests that loose ashes should never be dumped near the house.

ACCUMULATION OF RUBBISH

Needless accumulation of rubbish in attics, cellars, or other storage places add to the fire hazard of a building. They not only aid the spread of a fire and hinder its prompt extinction, but they may be directly responsible for starting a fire if there are oily rags capable of self-ignition among the rubbish, or if matches should be accidentally dropped and later ignited among the trash. The easiest way to dispose of most kinds of rubbish is to pile it at some distance from the house and set fire to the pile. But in so doing due care must be taken to see that buildings and other property are not endangered. Such fires should never be started on a windy day. Even on a still day the fire should be watched, not only until the blaze ceases but until all smoldering embers are dead.

CHRISTMAS TREES

Christmas trees, usually associated only with happiness and good will, have in many instances brought disaster and sorrow through thoughtlessness and carelessness. Burning candles on Christmas trees should not be permitted; and even if candles are not used, the decorations should consist of tinsel or other noncombustible material. They should not be made of paper, cotton, or similar flammable material that adds seriously to the fire hazards of the home.

SPONTANEOUS IGNITION OF HAY

The storage of hay in barns before it is well dried has caused many barn fires through spontaneous heating and ignition. Cured hay, which after storage has become wet from rain coming through a leaky roof or from floodwaters, also will heat and may ignite. Alfalfa, clover, and soybean hays with heavy stems that retain considerable moisture after the leaves appear to be dry are most likely to heat severely and cause a fire. Even though heating may not result in a fire, the hay undergoes a loss of nutrients that greatly lessens its feeding value.

Losses from fire and spoilage can be prevented by curing all hay sufficiently before storing it and by guarding against subsequent wetting. It is dangerous to place even small quantities of undercured hay in the mow, although the remainder of the lot is well cured. If in certain seasons the proper curing and drying of the hay is made difficult or impossible by frequent rains, it is safer to stack such hay in the field than to place it in the barn.

Frequent examinations should be made for several weeks after hay has been stored to learn the general condition of the hay. "Steam-

ing," irritating odors, and wet areas and flues in the hay are dangerous signs of severe heating. If these conditions continue the nearest fire department should be called upon for help. Mows of excessively hot hay should be removed from the barn, but first the heating areas should be thoroughly wet with water and provision should be made for fighting a possible fire, as the hay may burst into flames when uncovered or exposed to the air. The removed hay should be taken to an open field because it may ignite later.

Salting of damp or undercured hay to prevent spontaneous ignition is practiced to a considerable extent by farmers. Although salt in liberal quantities may retard fermentation, there is no evidence that the addition of salt to hay as it is stored, at least in quantities safe for feeding, will prevent spontaneous ignition. Until this question can be definitely settled by further experimentation too much reliance should not be placed on salting as a safeguard against spontaneous ignition and it should not be considered a substitute for sufficient curing of hay in the field.

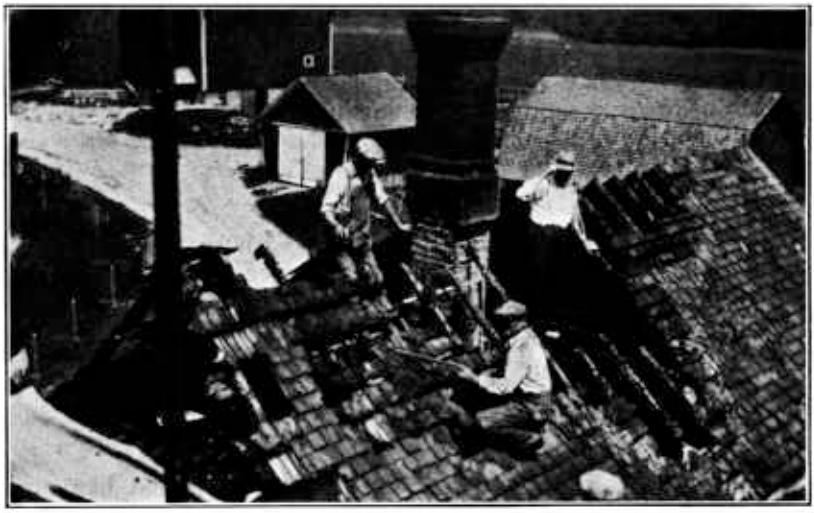

FIGURE 4.—A total loss from chimney sparks on the roof was averted by the timely aid of neighbors with simple home fire-fighting equipment.

HOME FIRE-FIGHTING EQUIPMENT

To be of real value, home fire-fighting equipment must be kept in a handy place and in condition for instant use. The successful use depends upon early discovery of the fire.

LADDERS

Numerous roof fires are caused by sparks from the top of the chimney or openings in its sides. A ready means of reaching the top of a roof has saved many a building. The results shown in figure 4 might have been avoided had the dwelling been provided with ladders. The appearance of buildings is sometimes marred by attaching fire ladders, but in many instances the ground ladder can be located inconspicuously and the roof ladder may be merely a narrow board having a few small cleats. Instead of attached ladders

it is well to have two light, strong, portable ladders, one of which has a large hook for hooking over the ridge pole. Householders should be sure ladders are in the best of repair. Fighting fire from ladders and roofs involves enough danger without taking the risk of using defective ladders.

FIRE PAILS AND BARRELS

Many small farm fires are extinguished with the use of a few pails, pans, or dippers of water. The water should be thrown so as to drench the burning material. If the water is directed toward the top of the flame most of the water is likely to be wasted.

Fire pails are usually of wood, fiber, or galvanized steel. They usually hold about 12 quarts. It is a good plan to paint the outside of the pails red and stencil **For Fire Only** on them in large black letters. Flat-bottom and cone-bottom pails are in use, but the latter are favored because they do not stand alone and therefore are less likely to be used for other purposes. One pail to each 400 or 500 square feet of area served is generally sufficient. The pails should be hung from hooks or brackets or set on shelves 2 to 4 feet from the floor.

The main shortcomings of pail protection are the tendency to use the pails for other purposes, failure to keep them filled, limiting the water reserve to the relatively few pails that can be kept on hand, and the difficulty or impossibility of reaching fire within flues, partitions, or walls, or on high ceilings, or roofs. Minor disadvantages relate to the evaporation, freezing, or stagnation of the water and the unsightliness of the pails. Tight, but easily removable, covers or lids will lessen evaporation, and 3 to 6 pounds of common salt or calcium chloride dissolved in each pail will usually prevent freezing. A brine of this strength will retard or prevent objectionable odors and the breeding of mosquitoes.

Storage of water in casks, barrels, or tanks adds much to the value of pails for fire fighting. Old oil barrels, pork barrels, or cider barrels holding 50 to 60 gallons are suitable. Much that has been stated regarding fire pails applies to other fire reserve containers.

WATER UNDER PRESSURE

To fight a well-ignited fire successfully requires more water and higher pressure than ordinarily is obtained with farm water systems. With 30 pounds pressure at the sill cock, 50 feet of ¾-inch rubber hose, and an ordinary $\frac{3}{16}$-inch nozzle, the discharge is 5 to 6 gallons per minute—only about 2 pailfuls. Such a stream directed at a large fire avails little, on account of its dispersion by heat, and it may happen that no water reaches the desired point. Other practical difficulties relate to frozen pipe lines, shortage or defects in the hose, misplaced nozzles, and lack of experience in the skillful use of the equipment when the time comes to fight fire. Although farm water systems are not generally given credit in insurance ratings, they may be of great value if a fire be discovered in its incipient stage, and it undoubtedly is wise, when a pressure system is installed, to provide a few well-placed hose connections. Farmers' Bulletin 1448, Farmstead Water Supply, describes in detail the installation of farm water systems.

FIRE EXTINGUISHERS

Putting out a fire with the least damage depends upon early discovery and rapid action. Portable extinguishers that contain a small quantity of water or other extinguishing agent are highly useful for this purpose. But they are intended only for the control of incipient fires, that is, fires in their early stages.

For convenience fires have been classified according to the way in which they can best be extinguished in their early stages: Class A, fires in ordinary combustibles, like wood, paper, textiles, and rubbish; class B, fires in small quantities of flammable liquids, oils, and greases; and class C, fires in electrical equipment. Fires are commonly put out in two ways: (1) By cooling (quenching) the burning material below its burning temperature, and (2) by smothering the fire and depriving it of the air (oxygen) necessary to support combustion. Class A fires are best put out by cooling with water or water solutions, and class B fires by smothering with a gas or foam. Class C fires introduce a third condition—that the stream applied be a nonconductor of electricity so as not to cause electrical shock or injury to the user.

Water is ordinarily not effective in fighting fires in flammable liquids. In fact, its use may spread the burning liquid over a larger area and make control of the fire more difficult. Water also is a conductor of electricity and its application on fires in electrical equipment may result in shock or injury.

There are several types of effective extinguishers suitable for use on the farm. They are briefly described here. Unfortunately there is no extinguisher on the market today which is equally effective on all three classes of fires.

PUMP-TANK TYPE

The pump-tank extinguisher uses either plain water or a nonfreezing solution of calcium chloride as the extinguishing agent and comes in two principal sizes, 2½ and 5 gallons. The tank is equipped with a pump for throwing the liquid a distance of 30 to 40 feet. If plain water is used, the extinguisher must be protected against freezing. This type of extinguisher should be kept full of water at all times, and it should be thoroughly cleaned at least once a year. The pump should be operated frequently, directing the liquid into the tank, and the pump parts should be kept well oiled or greased. This type of extinguisher is effective on incipient fires in wood, paper, textiles, rubbish, and other ordinary combustible materials.

SODA-ACID TYPE

The 2½-gallon soda-acid extinguisher is the most common size. It is so made that it can be hung on a wall in any convenient place. Turning the extinguisher upside down from the position in which it hangs causes the soda solution and acid to mix, resulting in the formation of carbon-dioxide gas, the pressure from which expels the solution through the hose. The extinguishing value of the soda-acid stream, which has force to carry a distance of 30 to 40 feet, with the flow continuing about 1 minute, is practically the same as an equal quantity of water.

Larger soda-acid extinguishers, the most common sizes being 20 and 40 gallons, are available on wheels. They are wheeled to the fire,

They discharge streams up to a distance of about 50 feet, the stream lasting about 3 minutes. The wheeled type of extinguisher should prove worth while on larger farms and estates for operation in and around the barns or other main buildings.

Soda-acid extinguishers must be recharged each year, as well as immediately after use. In winter they must be placed where the temperature remains above freezing. Salt or other antifreezing ingredients should not be added to the soda-acid type of extinguishers as this will interfere with the operation.

Soda-acid extinguishers are effective on incipient fires in wood, paper, textiles, rubbish, and other ordinary combustible materials.

VAPORIZING LIQUID (CARBON TETRACHLORIDE BASE) PUMP-GUN TYPE

The type of extinguisher known as the vaporizing liquid pump-gun type, of which the most common sizes are of 1-quart and 1½-quart capacity, uses carbon tetrachloride which has been specially treated to lower the freezing point to −50° F., and to prevent corrosion. The liquid is forced out by working the pump with one hand while holding the extinguisher with the other. The stream can be thrown a distance of 20 to 25 feet, and the liquid can be expelled at the rate of a quart in 40 seconds, with average operation.

Under the heat of the fire the carbon tetrachloride mixture vaporizes very rapidly. The vapor, formed as soon as the liquid hits the fire, is heavy and noncombustible, and in effect smothers the fire by shutting off the air (oxygen) necessary to support combustion. In using these extinguishers, especially in unventilated places like small rooms, closets, or confined spaces, precautions should be taken to avoid the effects that may be caused by breathing the vapors or gases produced.

This type of extinguisher should be partially discharged and refilled each year. No liquid except that furnished by the manufacturer should be used. Ordinary chemical carbon tetrachloride will not serve, as its freezing point has not been depressed and it corrodes the mechanism of the extinguisher.

The vaporizing-liquid extinguisher is effective on incipient or early fires in small quantities of flammable liquids, oils, and greases, and on incipient fires in electrical equipment, where the use of a nonconducting extinguishing agent is of first importance.

FOAM TYPE

The foam extinguisher is another type of chemical fire-fighting equipment. The most common size has a capacity of 2½ gallons. Turning the extinguisher upside down from the position in which it hangs causes two separately contained solutions to mix. Carbon dioxide gas is formed, the pressure of which expels from the extinguisher a foam of countless small bubbles filled with carbon dioxide gas. The foam can be discharged a distance of 30 to 40 feet for about 1 minute. It smothers the fire by clinging to the burning materials and excluding the air (oxygen) necessary to support combustion. As it contains a liberal quantity of water, the foam also has considerable cooling effect.

This type of extinguisher should be charged yearly as well as immediately after use, with chemicals supplied by the manufacturer. It must be protected against freezing, but antifreezing ingredients should not be added to depress the freezing point of the solutions.

Foam extinguishers are effective not only in incipient fires in wood, paper, textiles, rubbish, and other ordinary combustible materials, but also in small quantities of flammable liquids, oils, and greases.

OTHER MATERIALS AND DEVICES

SAND, SOIL, SODA, AND SAWDUST

Sand or soil is useful in preventing fires by covering or absorbing spilled flammable liquids. It may also be used in putting out small isolated fires in flammable liquids on floors. To be effective in smothering such a fire, a heavy blanket of sand or soil must be quickly applied.

Sawdust, evenly mixed with sodium bicarbonate in the proportion of 10 pounds of soda to 1 bushel of sawdust, is effective on fires in small quantities of lubricating oils and greases in open vessels or on floors when the mixture is applied rapidly and is spread over the entire surface.

The use of sand, soil, soda, and sawdust should be supplemented by fire extinguishers.

There are a number of devices on the market, such as the so-called dry-powder and hand-grenade or bulb-type extinguishers, which have attracted considerable attention. A brief description of these appliances intended for home use, with some indication of their shortcomings, will be found in the following paragraphs.

DRY-POWDER DEVICES

The so-called dry-powder extinguisher consists of a tube of cardboard or metal, usually filled with bicarbonate of soda mixed with some finely divided inert material to prevent caking. In pulling the tube from its supporting hook the cap is removed and the powder is discharged through the open end by forcibly waving the tube back and forth on the fire. The quantity of powder in these devices is necessarily small, and their effectiveness is principally dependent upon the powder being applied so as to blanket the burning area with a dust cloud. In the excitement of discovering and encountering a fire, there is considerable danger that little if any of the powder will be effectively used.

Another type of dry-powder appliance has been developed which consists of a metal container holding bicarbonate of soda mixed with fine material to prevent caking, and equipped with a built-in hand pump. The powder is forced out through the nozzle of the container by operating the pump. This type is an improvement over the old tube type in that the method of ejection should permit a more effective application of the powder upon the fire. One drawback appears to be the limited quantity of powder held in the container.

HAND-GRENADE OR BULB-TYPE DEVICES

The hand-grenade or bulb-type device consists of a sealed glass bulb filled with carbon tetrachloride and supported in a bracket attached to the wall. The plan is to throw the bulb at the fire, causing the glass container to break and release the contents on the fire. These grenades involve various chances of failure to get the extinguishing liquid released at the point intended. There is considerable chance that by inexperienced throwers they will be sent wide of the mark,

and there is the further possibility that unless they hit a hard surface, they may fail to break and release the liquid. Another drawback is the small quantity of liquid held in the bulb. These devices are also obtainable with either an automatic bulb-breaking or a bulb-releasing mechanism which operates when the room temperature in the vicinity of the bracket holding the bulb reaches 135° F., or some other designated point.

Under favorable conditions certain types of small fires may be controlled by dry-powder or bulb-type devices if the powder or the liquid is applied effectively and promptly. Their fire-extinguishing capacity, however, is very small as compared with that of the other types of extinguishers described on pages 16 and 17.

COMMUNITY FIRE PROTECTION

To bring out more clearly the relation of the third and final fire safeguard, community fire protection, to the other two, let it be assumed that in a certain farm community the suggestions already given have been adopted and followed in a practical way. In other words, let it be assumed that in this community all farmers give reasonable attention to the elimination of fire hazards in the construction and maintenance of their buildings, and exercise reasonable care in the selection and handling of equipment and material used in connection with household fires. Let it be assumed further that each farmhouse in this community is supplied with certain simple fire-fighting equipment which is readily at hand in designated places and with which a fire can be promptly reached and extinguished before it has attained seriously destructive proportions.

In such a farm community the average annual fire loss will be small. Accidental fires will occur only rarely, and of those that do occur a substantial percentage will be extinguished before the loss is serious. Absolute perfection in individual safeguards has not been assumed, but only such conditions as it would be humanly possible to attain with economic and other factors as they are. It is reasonably certain that even in such a community some fires will occur, and occasionally one of these fires will not be discovered until it is beyond control by means of any ordinary home fire-protection equipment. To the victim of such an occurrence it is slight comfort to know that this seldom happens in his community. What he wants and needs is help in putting out the fire, or at least in keeping it from spreading to other buildings or property.

Hence, even in such a community the need for organized rural fire protection will exist. How much more pronounced, then, is the need for such organized protection in the more typical farm community in which fire prevention and home fire-fighting equipment are given only meager attention?

A rural fire department may not be able in many cases to save the building in which fire breaks out, particularly if this building happens to be the barn. But in most cases it will prevent the fire from destroying other buildings and property on the place and will thereby substantially lessen the loss that otherwise would occur. Under favorable conditions even the dwelling or other building in which the fire originated may be saved from extensive damage.

Assuming that the fire-fighting apparatus is efficient and that the department is properly organized, trained, and maintained, its effectiveness in reducing fire losses on farms will depend upon a number of factors, among which are promptness in giving the alarm, condition of roads, distance to be traveled, water supply on the farm for fire department use, and location of buildings with respect to one another. Although the effectiveness of rural fire departments is limited in many instances by lack of telephone and water supplies and by poor roads, they have a good record in communities where these facilities are available.[5]

Fire insurance rates have been reduced in some localities as a result of the development of community fire organizations. In some instances the rate credit for farmers served by a rural fire department has been conditioned upon the farmer's having a telephone and an approved water supply.

There are two general types of rural community fire organizations. One is the voluntary-association type, either incorporated or unincorporated. The other is the type in which fire protection becomes a function of local government. Variations of these two types may be found that overlap somewhat.

The purchase, maintenance, and operation of rural fire equipment is financed in a number of ways. In many cases the money is raised through public subscription by farmers and townspeople, by the sale of association stock, or by charging a fee for membership in the association. In other instances the cost is met wholly or in part with money raised by local carnivals, fairs, and social enterprises. In perhaps a majority of instances all or a part of the funds come from governmental sources involving appropriation, tax levy, or bond issue through counties, townships, fire districts, towns, or combinations of these.

Economy in providing fire-protection service for farms may often be brought about through cooperation with towns or villages. The usual practice is to buy special equipment for farm use by the village fire department. In this way towns or villages may become better equipped and can answer rural calls without jeopardizing their own fire protection.

DEVELOPMENTS IN VARIOUS STATES

The practice of providing organized rural fire protection under some plan has been spreading rapidly during recent years. State and community officials and farm organizations as well as insurance companies are helping to promote interest in rural fire protection. Through the educational influence of farm meetings and fire-prevention drives, information on the need for organized fire protection, on procedure in organizing, and on proper fire-fighting equipment is being distributed to farmers to acquaint them with the essential facts and assist them in protecting their property against fire. It is not surprising, then, that today the number of rural communities that have some form of organized and specially equipped fire-protection service runs into the thousands.

Complete information on farm fire departments or service is not available for all States, but the following general statement is based

[5] See Farmers' Bulletin 1667, Rural Community Fire Departments.

on information supplied largely by State fire marshals or insurance commissioners.

In the New England States, particularly Maine, Vermont, and Connecticut, the majority of the farmers have fire protection either by special arrangement with nearby city or village departments that are provided with fire-fighting equipment appropriate for rural use or by rural cooperation in buying fire trucks and other necessary supplies. In many communities, particularly in New York State, local mutual fire-insurance companies have contributed toward fire equipment for departments in nearby towns in order that the members of these insurance companies may have fire protection.

In eastern Pennsylvania notable progress has been made in providing fire protection for rural communities, from cities, boroughs, and towns, and in a number of counties some of the townships have cooperated in the purchase of fire-fighting equipment. Berks County alone has 51 fire companies in the rural districts and villages besides 14 in the city of Reading. In other eastern States, and more especially in Maryland and Rhode Island, considerable progress has been made in safeguarding rural property by local arrangements for fire protection.[6]

In the Middle West, noteworthy advancement has been made in the fire protection available to farmers. Michigan, Ohio, Indiana, Illinois, Wisconsin, Iowa, Minnesota, and Nebraska are paying special attention to this problem. As early as 1928 the report of the fire marshal of the Michigan Department of Insurance indicated that 200 rural fire trucks were in operation in that State.

Among the far western States, California stands out as an early leader in this movement. During the period of the World War a substantial part of the State was organized on a county and community basis into rural fire-protection districts. Following the close of the war, lack of further progress in this movement, as well as of failure to hold the ground already gained, became evident. More recently, however, there has been a revival of interest in this problem. It has been estimated that in 1937 over one-third of the area of California, excluding deserts and national forests, is covered by fire protection. More than 200 rural fire trucks are in operation. Eight counties in the State are wholly protected, and 25 others have partial protection.

RURAL FIRE TRUCKS

There are two principal types of motorized fire apparatus suitable for farm and rural fire-protection service. One is what is known as a triple combination pumping car, having a pump, a fire hose body carrying 2½-inch hose, and chemical or water-tank equipment. The pumps have a capacity of 300 to 1,000 gallons per minute and are designed to pump water from any water supply that may be available, such as a hydrant, cistern, tank, brook, or pond. The chemical or water-tank equipment supplies a small stream for a limited time.

The other type of apparatus does not primarily depend on supplies of water at the scene of the fire but carries a large water tank with a small pump and necessary hose and other equipment, or a multiple-tank chemical unit.

---

[6] A recent book entitled "The Volunteer Fire Company," published by the National Fire Protection Association, describes the method of organization and operation used in certain communities of Maryland.

A guide to rural communities that wish to buy efficient motorized fire-fighting apparatus, which outlines certain minimum requirements relating to the operation and maintenance of the equipment, has been prepared by the Farm Fire Protection Committee of the National Fire Protection Association, in which committee the United States Department of Agriculture has leadership. This material has been published as a bulletin, entitled "Rural Fire Departments," by the National Fire Protection Association, 60 Batterymarch Street, Boston, Mass.

WATER SUPPLIES

Motorized fire apparatus carrying either chemical tanks or water tanks, or both, can cope only with fires of limited extent on farms, unless provision is made for an additional supply of water. Rural fire departments commonly use a ½-inch nozzle which requires about 50 gallons of water a minute (3,000 gallons per hour) for an effective fire stream. Sufficient water supply for at least 1 hour's pumping should be available.

Where a stream or pond with dependable supply is within a few hundred feet of farm buildings, the problem of additional supply is simple. It is necessary only to furnish easy access to the supply for the fire department pumper. The pond may need to be deepened or the stream dammed to make a pool from which suction can be taken. Such ponds or streams may be made attractive, and are often of practical value for livestock watering or other productive purposes.

Where no natural supply is available, additional storage of water can be provided by an underground tank or cistern. It is desirable to make the full capacity of the tank or reservoir 4,000 gallons, to allow for the tank not being full at all times. The tank should be centrally located and have suitable manhole opening for a suction hose. Regular inspection to insure full storage should be made. Elevated tanks which are part of the domestic water system may be used if of sufficient capacity and if a suitable hydrant or other connection is provided for the pumper.

The Farm Fire Protection Committee has prepared a report, Water Supplies for Fire Protection on Farms, published in bulletin form by the National Fire Protection Association, which suggests ways and means for the most efficient utilization of available water supplies in extinguishing farm fires, and mentions certain essential features that should be provided to give reasonably adequate fire protection when new water systems are contemplated.

LAWS ENCOURAGING ORGANIZED RURAL FIRE PROTECTION

In a number of States laws have been passed to encourage and promote organized rural fire protection. These laws permit townships, or districts organized specifically for fire protection, to appropriate money, levy taxes, and in some instances to issue bonds, either to purchase fire-protection equipment and provide for its maintenance and use, or to contract for such service from cities, towns, or villages. The States having such laws include California, Idaho, Illinois, Indiana, Iowa, Michigan, Minnesota, New York, Ohio, Oregon, Pennsylvania, and Wisconsin.

On the basis of the nature of the legislation on this subject these 12 States may be divided into 2 groups. The laws of the larger of

these groups, which includes seven States, provide for an enlargement of the powers of township governments to include the right to provide fire protection under stipulated conditions. The laws of the other group, which include California, Idaho, Illinois, New York, and Oregon, authorize the organization of special rural fire-protection districts without reference to township borders.

The laws in the States of the first group, which have what may be called the township plan, differ from one another in various respects. Although they all authorize the expenditures of township funds for fire protection, in some cases expenditures can be authorized only as a result of a vote of the township electors, in other cases township officers are empowered to authorize such expenditures. The amount that may be expended in any one year is usually limited, and the choice of organizing and equipping their own fire departments or of contributing to the equipment and support of an existing city, town, or village department which agrees to provide rural fire-protection service, is usually left with the township. Some of these laws provide not only that townships may enter into agreements with incorporated places to secure such protection but also that two or more townships may cooperate with one another in establishing, equipping, and maintaining fire-protection organizations.

The States that authorize the formation of rural fire-protection districts naturally have somewhat more elaborate legal provisions since in these cases it is necessary to set up a procedure for the incorporation and organization of these districts as well as to provide for their management. In the five States with laws of this kind, fire-protection districts may come into existence only as the result of a vote or a petition representing the major part either of the voters or of the property affected by the proposed action. Under the laws of California and New York the actual incorporating of such districts is done by the county supervisors, whereas in Illinois and Oregon the county judge of the county in which all or a major part of the proposed district is located takes charge of the special election for voting on the formation of the proposed district.

This movement is comparatively new, and the final value or significance of such laws cannot be determined at this time. It seems highly desirable, however, that organized rural fire protection should be encouraged and promoted by giving townships or other rural units an opportunity to provide for such protection wholly or in part through existing governmental machinery.

CONCLUSIONS

No practical application of fire safeguards either by the individual or by the community, or by both combined, will entirely eliminate the possibility of loss by fire. But the probability of such loss occurring to a given farm home can be greatly lessened, and the aggregate of the annual losses for any larger group or for all American farm homes can be greatly reduced from its present total. This should mean correspondingly reduced cost of insurance protection against such few losses as may occur and correspondingly greater personal safety to the farmer and his family.

The burning of a farm building worth $2,400 means to an owner who has no insurance that he himself loses that amount. To the owner of such a building who has his property insured to the usual

extent of about three-fourths of its value, such an occurrence means that the insurance company loses about $1,800 and he himself the remaining $600. In addition, as in the case of the uninsured owner, he suffers the inconvenience or loss of being without the building until it can be replaced. Regardless of whether the property was insured or not, the Nation is poorer by the $2,400 represented by the building burned unless a part of the insurance was carried in a foreign insurance company. In the latter case it would still be true that mankind is poorer by the full amount of the loss.

Insurance is indispensable to the individual who wishes to play safe. But insurance does not create wealth to replace that which is lost. It merely distributes the loss, or a greater part of it, over a larger or smaller group of individuals. It is no real substitute for fire prevention and fire protection either from the point of view of the honest insured or from that of civilized society. This general truth applies to farmers quite as much as to any other economic group. Reasonable fire safeguards for the farm in the form of proper fire-prevention measures, simple but effective home fire-fighting equipment, and organized rural fire protection are essential to rural progress and safety.

ORGANIZATION OF THE UNITED STATES DEPARTMENT OF AGRICULTURE WHEN THIS PUBLICATION WAS LAST PRINTED

Secretary of Agriculture	HENRY A. WALLACE.
Under Secretary	M. L. WILSON.
Assistant Secretary	HARRY L. BROWN.
Director of Extension Work	C. W. WARBURTON.
Director of Finance	W. A. JUMP.
Director of Information	M. S. EISENHOWER.
Director of Personnel	W. W. STOCKBERGER.
Director of Research	JAMES T. JARDINE.
Solicitor	MASTIN G. WHITE.
Agricultural Adjustment Administration	H. R. TOLLEY, *Administrator.*
Bureau of Agricultural Economics	A. G. BLACK, *Chief.*
Bureau of Agricultural Engineering	S. H. MCCRORY, *Chief.*
Bureau of Animal Industry	JOHN R. MOHLER, *Chief.*
Bureau of Biological Survey	IRA N. GABRIELSON, *Chief.*
Bureau of Chemistry and Soils	HENRY G. KNIGHT, *Chief.*
Commodity Exchange Administration	J. W. T. DUVEL, *Chief.*
Bureau of Dairy Industry	O. E. REED, *Chief.*
Bureau of Entomology and Plant Quarantine	LEE A. STRONG, *Chief.*
Office of Experiment Stations	JAMES T. JARDINE, *Chief.*
Farm Security Administration	W. W. ALEXANDER, *Administrator.*
Food and Drug Administration	WALTER G. CAMPBELL, *Chief.*
Forest Service	FERDINAND A. SILCOX, *Chief.*
Bureau of Home Economics	LOUISE STANLEY, *Chief.*
Library	CLARIBEL R. BARNETT, *Librarian.*
Bureau of Plant Industry	FREDERICK D. RICHEY, *Chief.*
Bureau of Public Roads	THOMAS H. MACDONALD, *Chief.*
Soil Conservation Service	H. H. BENNETT, *Chief.*
Weather Bureau	WILLIS R. GREGG, *Chief.*

U. S. GOVERNMENT PRINTING OFFICE: 1938

For sale by the Superintendent of Documents, Washington, D. C. - - - - Price 5 cents